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Decommissioning De Soto

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Radiation Survey for Release for Unrestricted Use of Hot Chemistry Laboratory Area, ESG Headquarters, Building 004

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ABSTRACT

Following cleanup of any previously detected radioactivity exceeding specified limits, a radiation survey was performed in the parts of Building 004 used on the ATR Fuel Fabrication Program. The results of this survey show that these regions meet the criteria established by NRC for release for unrestricted use.

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FIGURES

I. INTRODUCTION

A portion of Building 004 at the Headquarters site was used on the ATR Fuel Fabrication Program for analysis of reactor fuel (UAl_x powder) using enriched uranium. This work has most recently been conducted under the NRC Special Nuclear Materials License No. SNM-21.[1] It was decided to decontaminate this portion of Building 004 at Headquarters, and eliminate it from this license.*

Conditions 22 and 46 of the license impose Annex C (attached here as Appendix B) as a requirement for decontamination of facilities and equipment for release for unrestricted use. The requirements of Annex C have been followed.

TABLE I-1
SUMMARY OF SURVEY RESULTS
REGIONS IA and IB

Measurement	Number of Locations	Average Value (dpm/100 cm^2)	Maximum Value (dpm/100 cm^2)	Limit
Average alpha	155	18.74	344	5,000
Removable alpha	155	1.66	12	1,000
Average beta	155	492	2274	5,000
Removable beta	155	5.51	84	1,000

In all cases, the maximum value is well below the limit. The results summarized in this table confirm that the area is acceptable for release for unrestricted use.

*The working document which describes this activity is ESG N065ACR630004, "Building 004 Analytical Radiochemistry Labs Decontamination and Decommissioning Activity Requirements," dated December 1, 1982.

II. IDENTIFICATION OF PREMISES

The premises to be released consist of part of Building 004 at the Headquarters (or De Soto) site. This site is shown in Figure 1. It is located at 8900 De Soto Avenue in Canoga Park, California.

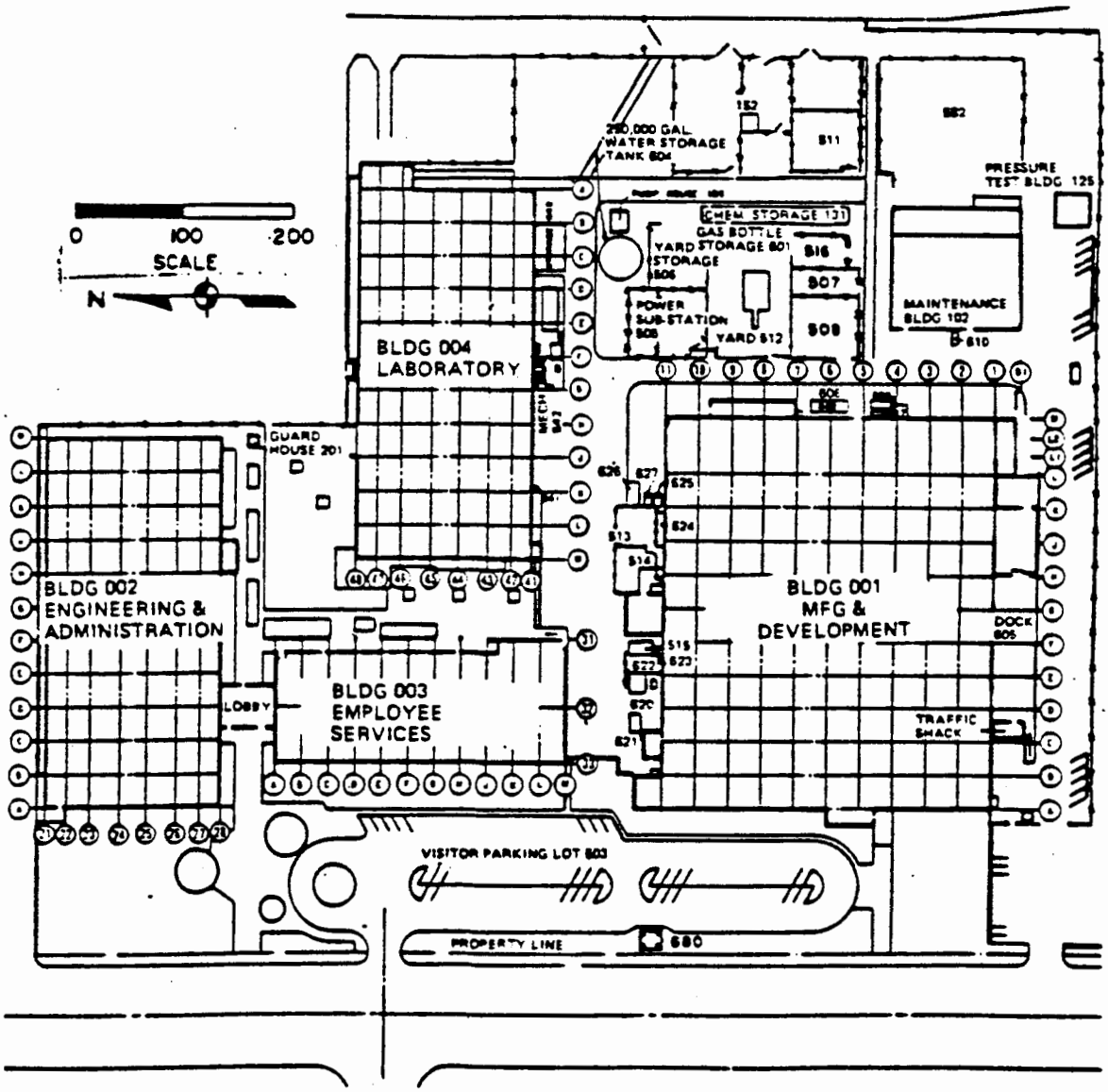

Figure 1. De Soto Avenue (Headquarters) Site in Canoga Park

Figure 2 shows the main radiochemistry laboratory located on the second floor of Building 004. Two additional rooms on the first floor, used for spectroscopy analysis, were also decontaminated in this effort.

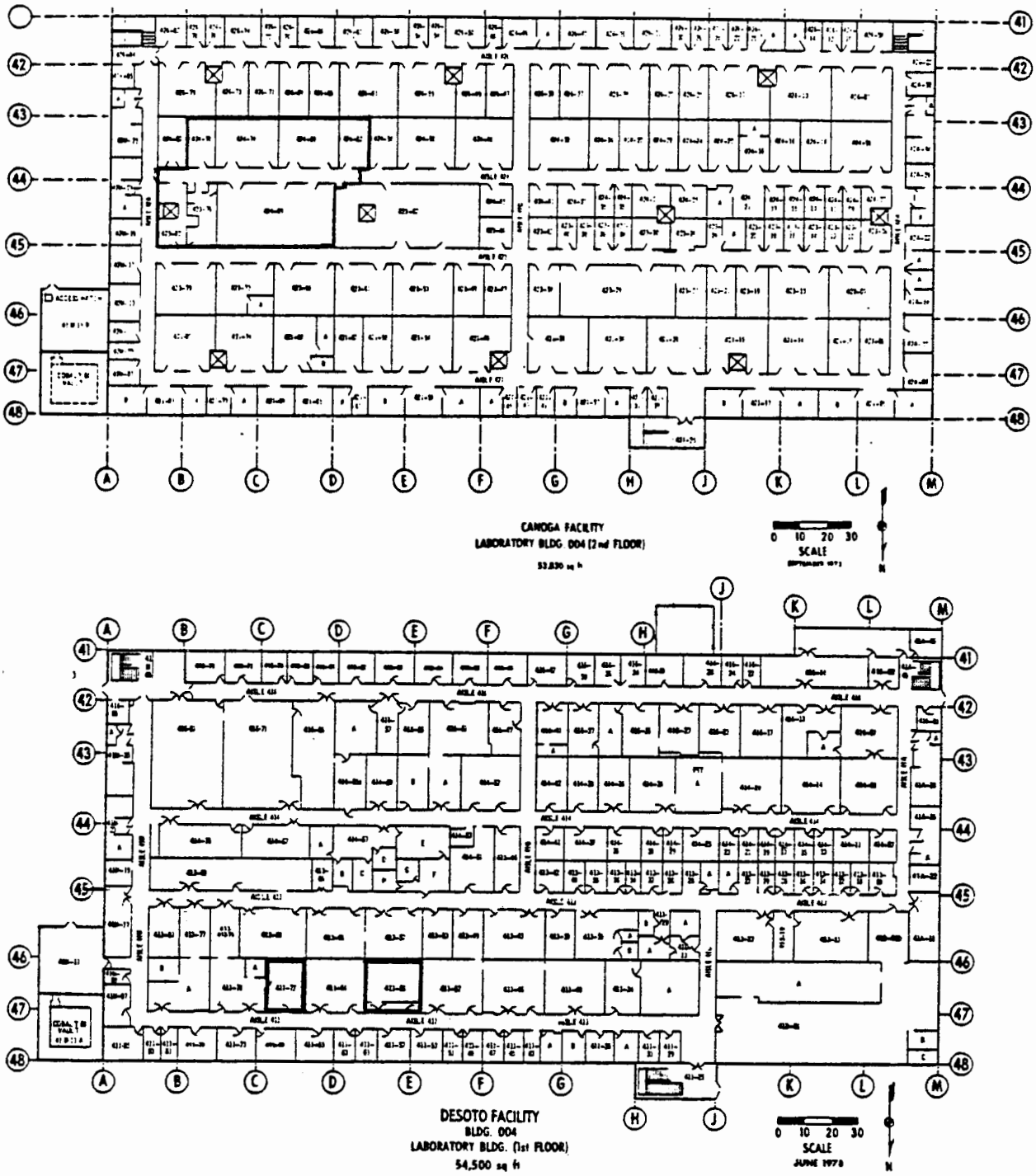

Figure 2. Building 004 Radiochemistry Laboratory

III. DECONTAMINATION EFFORTS

This area was used for the analysis of ATR reactor fuel (UAl_x powder) using a uranium enrichment of 93%. This work began in 1959. Uranium analyses in these areas had ended by 1983 and, as the projects ended and as work areas were relocated, the readily accessible areas were generally cleaned to acceptable levels.

The comprehensive decontamination effort was commenced per ref. Act. Spec. This effort included the removal of all laboratory equipment and facilities (hoods, benches, cabinets, etc.), removal of radioactive exhaust facilities and drain lines, and removal of floor tile. Small amounts of residual activity were detected on the concrete floor surface and were removed by scabbling. All materials leaving the area were monitored for contamination and disposed of by land burial when in excess of regulatory guidelines for unrestricted use.

IV. SURVEY SCOPE AND PROCEDURES

A. SURVEY SCOPE

A sampling inspection plan using variables has been used to demonstrate that the residual contamination in the area is below the following limits:

Total average over 1 m^2	5,000 dpm/100 cm^2
Total maximum over 100 cm^2	15,000 dpm/100 cm^2
Removable	1,000 dpm/100 cm^2

The sampling inspection plan that was used is based upon a uniform 3-m (10-ft) square grid superimposed on the area. A 3-m-square grid has been adopted to be consistent with NRC and State of California guidance. The actual grid in each room was benchmarked in the northwest corner of the room. An identical grid was reflected onto the ceiling. A similar grid structure was also applied to the walls, benchmarked in the upper left corner of the walls. Each survey area has been identified with codes indicating the surface (F = floor; C = ceiling; N, E, S, W = north, east, south, and west walls, respectively) and a two-figure Cartesian coordinate showing the distance in meters from a local benchmark.

Within each square defined by the grid lines, a single 1-m^2 area was surveyed. Each area was outlined by felt marker or paint, with its coordinates marked within or beside the 1-m^2 area. The location of this 1-m^2 area was left to the surveyor's judgment: it was to be the area that, in his judgment, was most likely to have retained the most residual contamination of any similar area within the grid square. The surveyor was instructed to do this conscientiously to assure that any significant residual contamination would be detected before a report of acceptability was made to a regulatory agency. The use of a predetermined grid with discretion for the exact location provides a biased-uniform survey; selection of one 1-m^2 area out of the nine within each grid square provides an 11% sampling of the surface.

Sampling inspection consists of a sampling plan for selection of items to be tested--in this case, locations to be measured for radioactivity, and the method of analysis. The sampling plan used for this phase was to inspect one 1-m^2 area out of every other 3-m grid square throughout the regions.

This 11% inspection (compared to 10% as recommended by the State of California) was used for these areas.

The 1-m^2 area chosen by the procedure described above is first measured for total alpha and beta activity and then for removable activity.

B. PROCEDURES

The following procedures were used in performing this survey.

1. Average Contamination Measurement

1) Identify 1-m^2 area to be measured.
2) With a portable scaler (Technical Associates FS-8 or equivalent) set for 5-min count time, use an alpha probe (Ludlum Model 43-1 or equivalent) or a beta probe (Ludlum Model 44-9 or Associates Model P-11 or equivalent) and uniformly scan the area. (Watch for and note any "hot spots" where the radioactivity may exceed the average limit. These are to be resurveyed later.)
3) Record the location and total count.
4) The total count is converted to dpm/100 cm^2 total surface activity by:

$$SA_T = \left(\frac{C - B}{5}\right) E \left(\frac{100}{A}\right)$$

where

SA_T = total surface activity in dpm/100 cm^2
C = total count in 5 min
5 = count time, min
B = background count in 5 min (generally 0-5 for alpha and about 200-220 for beta)
E = efficiency factor, dpm/cpm (generally 4 for alpha and 7 for beta)
100 = 100 cm^2 standard area
A = probe sensitive area (69 cm^2 for Ludlum Model 43-1 alpha scintillator; 20 cm^2 for Ludlum Model 44-9 and Technical Associates Model P-11 pancake G-M).

(Note that the analysis is done using counts rather than count rates.)

2. Maximum Contamination Measurement

1) Return to any area identified as having a "hot spot."
2) Repeat the uniform scan of only the hot spot area, covering approximately 100 cm^2 with the probe.
3) Record the location and total count as a "hot spot" measurement.
4) The total count is converted to dpm/100 cm^2 as shown above.

3. Removable Contamination Measurement

1) Identify 1-m^2 area to be measured.
2) Using a Whatman 540 filter paper (2.4 cm diameter), wipe a "Z" or "S" pattern, with legs approximately 6 in. long, so as to sample removable contamination from an area of approximately 100 cm^2.
3) Place smear paper in file card "book" until ready for counting.
4) Count radioactivity using gas-flow proportional counter (NMC Model ACS-77 or equivalent) for 5 min.

5) Record the location and both the total alpha count and the total beta count.

6) The total counts are converted to dpm/100 cm^2 removable surface activity by:

$$SA_R = \left(\frac{C - B}{5}\right)E$$

where the appropriate alpha and beta backgrounds and efficiency factors are used. Backgrounds are typically 1-3 counts for alpha and 120-150 counts for beta. Efficiency factors are about 4 dpm/cpm for alpha and beta.

V. SURVEY RESULTS

The survey of this area was conducted using the aforementioned standard survey plan. No reduction in sampling was applied to this area. The results of the survey are listed in Appendix A. A summary of the survey results appears below in Table V-1. Due to project scheduling considerations, and the extremely low levels of residual contamination measured in this survey, it was decided that statistical data analysis was not required for this limited area.

TABLE V-1
SUMMARY OF SURVEY RESULTS
REGIONS IA and IB

Measurement	Number of Locations	Average Value (dpm/100 cm ^{2})	Maximum Value (dpm/100 cm^2)	Limit
Average alpha	155	18.74	344	5,000
Removable alpha	155	1.66	12	1,000
Average beta	155	492	2274	5,000
Removable beta	155	5.51	84	1,000

In all cases, the maximum value is well below the limit. The results summarized in this table confirm that the area is acceptable for release for unrestricted use.

VI. CONCLUSIONS

An appropriate survey has been conducted throughout the area to be released. All remaining measured values of residual radioactivity are below the acceptance limit. The results of this survey show essentially no residual contamination and demonstrate a negligible risk of there being any undetected contamination exceeding the acceptance limits. Therefore, upon concurrence by NRC, the area may be released for unrestricted use.

VII. REFERENCES

1. Special Nuclear Materials License No. SNM-21 and Technical Specification for Operations at Atomics International, AI-75-46 and License Conditions

2. "Disposal or Onsite Storage of Thorium or Uranium Wastes from Past Operations," Federal Register 46, (205), 52061, October 23, 1981

3. "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use," ("DECON-1") State of California, Radiologic Health Branch, Department of Health Services (June 1977)

APPENDIX A

SURVEY RESULTS

Building 004 Hot Chemistry Labs - Final Survey

ROOM	SUR	GRID	TYPE	GROSS CPM	DPM/100 CM SQ
01	E	0103	ALPHA	5	0
01	E	0503	ALPHA	17	18
01	S	0303	ALPHA	50	66
01	F	0303	ALPHA	32	41
01	F	0106	ALPHA	10	7
01	N	0301	ALPHA	6	1
01	N	0202	ALPHA	9	6
01	N	0602	ALPHA	3	-3
01	C	0206	ALPHA	3	-3
01	C	0201	ALPHA	12	11
01	N	0301	BETA	183	25
01	N	0202	BETA	174	-50
01	N	0602	BETA	196	133
01	C	0201	BETA	241	509
01	C	0206	BETA	210	250
01	F	0106	BETA	309	1057
01	F	0106	BETA	288	871
01	N	0301	BETA	183	25
01	N	0202	BETA	174	-50
01	N	0602	BETA	196	133
01	C	0206	BETA	210	250
01	C	0201	BETA	241	509
01	E	0103	BETA	191	77
01	E	0503	BETA	201	163
01	S	0303	BETA	208	223
01	F	0303	BETA	330	1274
01	F	0106	BETA	430	2135
02	N	0102	ALPHA	7	3
02	N	0303	ALPHA	8	4
02	N	0701	ALPHA	11	9
02	E	0203	ALPHA	9	6
02	E	0502	ALPHA	7	3
02	S	0102	ALPHA	6	1
02	S	0403	ALPHA	10	8
02	S	0702	ALPHA	3	-3
02	W	0202	ALPHA	9	6
02	W	0601	ALPHA	10	8
02	F	0105	ALPHA	11	9
02	F	0201	ALPHA	19	22
02	F	0504	ALPHA	28	36
02	F	0702	ALPHA	21	25
02	F	0706	ALPHA	23	28
02	C	0203	ALPHA	11	9
02	C	0206	ALPHA	6	1
02	C	0301	ALPHA	3	-3
02	C	0604	ALPHA	3	-3
02	C	0606	ALPHA	9	6
02	N	0102	BETA	195	111
02	N	0303	BETA	200	154

Building 004 Hot Chemistry Labs - Final Survey

ROOM	SUR	GRID	TYPE	GROSS CPM	DPM/100 CM SQ
02	N	0701	BETA	170	-34
02	E	0203	BETA	190	60
02	E	0502	BETA	213	265
02	S	0102	BETA	164	-154
02	S	0403	BETA	176	-51
02	S	0702	BETA	162	-171
02	W	0202	BETA	188	51
02	W	0601	BETA	177	-42
02	F	0105	BETA	349	1431
02	F	0201	BETA	311	1105
02	F	0504	BETA	357	1499
02	F	0702	BETA	369	1602
02	F	0706	BETA	307	1071
02	C	0203	BETA	219	317
02	C	0206	BETA	208	222
02	C	0301	BETA	190	68
02	C	0604	BETA	200	154
02	C	0606	BETA	191	77
02	F	0105	BETA	248	515
02	F	0702	BETA	274	746
03	N	0103	ALPHA	7	7
03	N	0502	ALPHA	2	0
03	N	0701	ALPHA	6	6
03	E	0302	ALPHA	6	6
03	E	0602	ALPHA	7	7
03	S	0103	ALPHA	3	1
03	S	0402	ALPHA	7	7
03	S	0703	ALPHA	4	3
03	W	0102	ALPHA	3	1
03	W	0503	ALPHA	3	1
03	C	0203	ALPHA	3	1
03	C	0402	ALPHA	5	4
03	C	0407	ALPHA	3	1
03	C	0601	ALPHA	3	1
03	C	0605	ALPHA	5	4
03	F	0104	ALPHA	14	17
03	F	0301	ALPHA	13	15
03	F	0307	ALPHA	22	30
03	F	0403	ALPHA	26	36
03	F	0605	ALPHA	6	4
03	N	0103	BETA	214	281
03	N	0502	BETA	181	8
03	N	0701	BETA	285	870
03	E	0302	BETA	179	-8
03	E	0602	BETA	155	-207
03	S	0103	BETA	207	223
03	S	0402	BETA	170	-82
03	S	0703	BETA	187	58
03	W	0102	BETA	212	265

Building 004 Hot Chemistry Labs - Final Survey

ROOM	SUR	GRID	TYPE	GROSS CPM	DPM/100 SQ	CM
03	W	0503	BETA	213	273	
03	C	0203	BETA	292	928	
03	C	0402	BETA	109	157	
03	C	0407	BETA	221	339	
03	C	0601	BETA	233	439	
03	C	0605	BETA	239	489	
03	F	0104	BETA	327	1227	
03	F	0301	BETA	388	1740	
03	F	0307	BETA	292	933	
03	F	0403	BETA	357	1480	
03	F	0606	BETA	328	1236	
04	W	0601	ALPHA	3	0	
04	C	0202	ALPHA	1	-3	
04	C	0206	ALPHA	5	3	
04	W	0601	BETA	197	134	
04	C	0202	BETA	220	327	
04	C	0206	BETA	194	109	
04	N	0103	ALPHA	13	16	
04	E	0303	ALPHA	8	9	
04	E	0602	ALPHA	5	4	
04	S	0303	ALPHA	6	6	
04	W	0303	ALPHA	5	4	
04	F	0202	ALPHA	29	40	
04	F	0503	ALPHA	229	344	
04	N	0103	ALPHA	13	18	
04	E	0303	ALPHA	8	9	
04	E	0602	ALPHA	5	4	
04	S	0303	ALPHA	6	6	
04	W	0303	ALPHA	5	4	
04	F	0202	ALPHA	29	44	
04	F	0503	ALPHA	229	375	
04	N	0103	BETA	200	177	
04	E	0303	BETA	194	128	
04	E	0602	BETA	159	-152	
04	S	0303	BETA	226	386	
04	W	0303	BETA	244	531	
04	F	0202	BETA	352	1400	
04	F	0503	BETA	313	1086	
04	F	0503	ALPHA	4	1	
04	F	0503	ALPHA	3	0	
05	N	0102	ALPHA	4	1	
05	N	0501	ALPHA	18	25	
05	N	0803	ALPHA	11	13	
05	N	1402	ALPHA	10	11	
05	E	0401	ALPHA	6	5	
05	S	0101	ALPHA	3	0	
05	S	1201	ALPHA	11	13	
05	W	0701	ALPHA	0	0	
05	C	0202	ALPHA	6	5	

Building 004 Hot Chemistry Labs - Final Survey

ROOM	SUR	GRID	TYPE	GROSS CPM	DPM/100 CM SQ
05	C	0205	ALPHA	3	0
05	C	0602	ALPHA	6	5
05	C	0507	ALPHA	9	8
05	C	0706	ALPHA	10	11
05	C	0801	ALPHA	7	6
05	C	1006	ALPHA	11	13
05	C	1207	ALPHA	12	15
05	S	1402	ALPHA	5	1
05	W	0402	ALPHA	4	0
05	F	0302	ALPHA	38	57
05	F	0105	ALPHA	36	54
05	F	0504	ALPHA	71	113
05	F	0601	ALPHA	128	209
05	C	1305	ALPHA	6	3
05	C	1102	ALPHA	8	6
05	C	1401	ALPHA	3	-1
05	N	1102	ALPHA	7	3
05	E	0202	ALPHA	3	-3
05	E	0703	ALPHA	7	3
05	S	0603	ALPHA	10	8
05	S	0903	ALPHA	11	9
05	W	0103	ALPHA	12	11
05	F	0307	ALPHA	48	68
05	F	0806	ALPHA	84	126
05	F	0903	ALPHA	43	60
05	F	1101	ALPHA	29	38
05	F	1204	ALPHA	38	52
05	F	1207	ALPHA	41	57
05	F	1402	ALPHA	22	27
05	N	1102	BETA	267	695
05	E	0202	BETA	196	114
05	E	0703	BETA	185	24
05	S	0603	BETA	183	0
05	S	0903	BETA	460	2274
05	W	0103	BETA	161	-171
05	F	0307	BETA	346	1341
05	F	0806	BETA	329	1202
05	F	0903	BETA	261	646
05	F	1101	BETA	320	1128
05	F	1204	BETA	339	1284
05	F	1207	BETA	333	1235
05	F	1402	BETA	314	1079
05	F	0601	ALPHA	4	1
05	S	0903	BETA	212	207
05	N	0102	BETA	169	-48
05	N	0501	BETA	175	0
05	N	0803	BETA	212	296
05	N	1402	BETA	328	1227
05	E	0401	BETA	180	40

Building 004 Hot Chemistry Labs - Final Survey

ROOM	SUR	GRID	TYPE	GROSS CPM	DPM/100 CM SQ
05	S	0101	BETA	109	112
05	S	1201	BETA	210	280
05	W	0701	BETA	187	96
05	C	0202	BETA	197	176
05	C	0205	BETA	231	449
05	C	0602	BETA	210	280
05	C	0507	BETA	223	384
05	C	0706	BETA	210	280
05	C	0801	BETA	236	489
05	C	1006	BETA	188	104
05	C	1207	BETA	223	384
05	F	0504	BETA	333	1284
05	S	1402	BETA	193	167
05	W	0402	BETA	183	87
05	F	0302	BETA	372	1596
05	F	0105	BETA	345	1380
05	F	0601	BETA	319	1173
05	C	1305	BETA	232	478
05	C	1102	BETA	248	606
05	C	1401	BETA	283	885
06	E	0102	ALPHA	1	-6
06	E	0503	ALPHA	3	-3
06	S	0203	ALPHA	7	3
06	W	0202	ALPHA	4	-1
06	W	0503	ALPHA	3	-3
06	F	0106	ALPHA	21	24
06	F	0202	ALPHA	49	67
06	N	0101	ALPHA	9	6
06	C	0202	ALPHA	7	3
06	C	0206	ALPHA	2	-4
06	N	0101	BETA	212	267
06	C	0202	BETA	219	325
06	C	0206	BETA	211	258
06	E	0102	BETA	215	284
06	E	0503	BETA	286	895
06	S	0203	BETA	180	-17
06	W	0202	BETA	183	8
06	W	0503	BETA	183	8
06	F	0106	BETA	288	912
06	F	0202	BETA	369	1610
07	N	0602	ALPHA	9	6
07	S	2103	ALPHA	5	0
07	F	0401	ALPHA	24	30
07	F	0702	ALPHA	16	17
07	N	0602	BETA	157	-204
07	S	2103	BETA	211	237
07	F	0401	BETA	322	1145
07	F	0702	BETA	449	2184
07	C	0302	ALPHA	9	0

Building 004 Hot Chemistry Labs - Final Survey

ROOM	SUR	GRID	TYPE	GROSS CPM	DPM/100 CM SQ
07	W	1802	ALPHA	10	8
07	S	0603	ALPHA	12	11
07	S	1402	ALPHA	11	10
07	F	1101	ALPHA	44	65
07	F	1502	ALPHA	54	81
07	F	2001	ALPHA	9	6
07	N	1203	ALPHA	10	8
07	N	1203	BETA	159	-155
07	N	1802	BETA	174	-25
07	S	0603	BETA	160	-147
07	S	1402	BETA	161	-138
07	F	1101	BETA	290	978
07	F	1502	BETA	312	1169
07	F	2001	BETA	243	571
07	C	0302	BETA	215	329
07	N	2303	ALPHA	6	4
07	C	0801	ALPHA	6	4
07	C	1302	ALPHA	3	0
07	C	1701	ALPHA	3	0
07	C	2402	ALPHA	3	0
07	S	1702	ALPHA	2	-1
07	F	2502	ALPHA	10	10
07	N	2303	BETA	170	-107
07	C	0801	BETA	172	-89
07	C	1302	BETA	151	-276
07	C	1701	BETA	194	107
07	C	2402	BETA	158	-214
07	S	1702	BETA	165	-222
07	F	2502	BETA	258	604
07	F	0702	BETA	316	1120
07	F	0702	BETA	331	1253
07	F	0702	BETA	349	1413
07	F	0702	BETA	310	1054
08	N	0302	ALPHA	14	14
08	E	0302	ALPHA	9	6
08	E	0702	ALPHA	18	20
08	E	0902	ALPHA	15	16
08	S	0102	ALPHA	13	12
08	W	0202	ALPHA	12	11
08	W	0602	ALPHA	47	67
08	W	0902	ALPHA	5	0
08	F	0102	ALPHA	12	11
08	F	0104	ALPHA	11	9
08	F	0306	ALPHA	15	16
08	C	0103	ALPHA	4	-1
08	C	0105	ALPHA	3	-3
09	N	0102	ALPHA	2	-4
09	E	0202	ALPHA	5	0
09	E	0602	ALPHA	28	36

Building 004 Hot Chemistry Labs - Final Survey

ROOM	SUR	GRID	TYPE	GROSS CPM	DPM/100 SQ	C
09	E	1202	ALPHA	6	1	
09	S	0202	ALPHA	12	10	
09	W	0101	ALPHA	4	-1	
09	W	0302	ALPHA	14	13	
09	W	0602	ALPHA	4	-1	
09	F	0104	ALPHA	28	35	
09	F	0201	ALPHA	11	9	
09	F	0306	ALPHA	14	13	
09	C	0103	ALPHA	6	1	
09	C	0302	ALPHA	7	3	
09	C	0306	ALPHA	6	1	
09	E	0602	BETA	369	1591	
09	E	0602	ALPHA	33	47	
09	S	0202	BETA	209	232	
09	W	0101	BETA	194	103	
09	W	0302	BETA	179	-25	
09	W	0602	BETA	200	154	
09	F	0104	BETA	317	1162	
09	F	0201	BETA	306	1067	
09	F	0306	BETA	325	1231	
09	C	0103	BETA	214	275	
09	C	0302	BETA	232	430	
09	C	0306	BETA	220	327	

SMEAR DATA — 004 Hot Chem Lab

ROOM	SUR	GRID	TYPE	ALPHA COUNTS	BETA COUNTS	ALPHA DPM/100 CM SQ	BETA-GAMMA DPM/100 CM SQ
01	E	0103	SMEAR	1	134	-.7	4.6
01	F	0103	SMEAR	4	140	1.4	9.2
01	C	0201	SMEAR	3	127	0.7	-.7
01	W	0202	SMEAR	2	129	0.0	0.0
01	C	0205	SMEAR	5	127	2.2	-.7
01	N	0301	SMEAR	2	136	0.0	6.1
01	S	0303	SMEAR	13	126	8.2	-1.5
01	F	0303	SMEAR	5	140	2.2	9.2
01	E	0503	SMEAR	14	142	8.9	10.0
01	W	0502	SMEAR	1	120	-.7	-6.1
02	N	0102	SMEAR	1	145	-.7	10.8
02	S	0102	SMEAR	2	132	0.0	0.7
02	F	0105	SMEAR	4	112	1.4	-14.6
02	F	0201	SMEAR	1	147	-.7	12.3
02	W	0202	SMEAR	5	142	2.1	8.4
02	E	0203	SMEAR	5	130	2.1	-.7
02	C	0203	SMEAR	11	155	6.3	18.5
02	C	0205	SMEAR	5	144	2.1	10.0
02	C	0301	SMEAR	4	136	1.4	3.8
02	N	0303	SMEAR	4	141	1.4	7.7
02	S	0403	SMEAR	5	149	2.1	13.8
02	E	0502	SMEAR	2	135	0.0	3.0
02	F	0504	SMEAR	4	132	1.4	0.7
02	W	0501	SMEAR	1	126	-.7	-3.0
02	C	0504	SMEAR	1	124	-.7	-5.4
02	C	0606	SMEAR	10	131	5.6	0.0
02	N	0701	SMEAR	5	125	2.1	-4.6
02	S	0702	SMEAR	3	120	0.7	-8.4
02	F	0702	SMEAR	7	146	3.5	11.5
02	F	0706	SMEAR	7	140	3.5	6.9
03	W	0102	SMEAR	3	140	0.7	6.9
03	N	0103	SMEAR	3	131	0.7	0.0
03	S	0103	SMEAR	5	135	2.1	3.0
03	F	0104	SMEAR	2	129	0.0	-1.5
03	C	0203	SMEAR	4	123	1.4	-6.1
03	F	0301	SMEAR	1	131	-.7	0.0
03	E	0302	SMEAR	3	148	0.7	13.1
03	F	0307	SMEAR	7	145	3.6	10.8
03	S	0402	SMEAR	11	131	6.5	0.0
03	C	0402	SMEAR	5	115	2.1	-12.3
03	F	0403	SMEAR	7	131	3.6	0.0
03	C	0407	SMEAR	5	138	2.1	5.4
03	N	0502	SMEAR	7	134	3.6	2.3
03	W	0503	SMEAR	3	137	0.7	4.6
03	C	0601	SMEAR	2	118	0.0	-10.0
03	E	0602	SMEAR	0	130	-1.4	5.4
03	C	0605	SMEAR	1	119	-.7	-9.2
03	F	0606	SMEAR	2	123	0.0	-6.1

SMEAR DATA — 004 Hot Chem Lab

ROOM	SUR	GRID	TYPE	ALPHA COUNTS	BETA COUNTS	ALPHA DPM/100 CM SQ	BETA-GAMMA DPM/100 CM SQ
03	N	0701	SMEAR	3	136	0.7	3.8
03	S	0703	SMEAR	4	137	1.4	4.6
04	N	0103	SMEAR	18	142	12.0	15.4
04	F	0202	SMEAR	5	133	2.2	8.4
04	C	0202	SMEAR	2	136	0.0	10.8
04	C	0206	SMEAR	12	130	7.5	6.1
04	E	0303	SMEAR	14	210	9.0	67.9
04	S	0303	SMEAR	6	141	3.0	14.6
04	W	0303	SMEAR	4	150	1.5	21.6
04	F	0503	SMEAR	6	138	3.0	12.3
04	W	0601	SMEAR	5	143	2.2	16.2
04	E	0602	SMEAR	5	119	2.2	-2.3
05	S	0101	SMEAR	3	135	0.7	12.4
05	N	0102	SMEAR	6	134	3.0	11.6
05	W	0103	SMEAR	4	143	1.5	18.6
05	F	0105	SMEAR	3	131	0.7	9.3
05	E	0202	SMEAR	2	127	0.0	6.2
05	C	0202	SMEAR	5	125	2.2	4.6
05	C	0205	SMEAR	5	102	2.2	-13.2
05	F	0302	SMEAR	3	117	0.7	-1.5
05	F	0307	SMEAR	3	117	0.7	-1.5
05	E	0401	SMEAR	2	131	0.0	9.3
05	W	0402	SMEAR	9	107	5.2	-9.3
05	N	0501	SMEAR	6	116	3.0	-2.3
05	F	0504	SMEAR	4	146	1.5	21.0
05	C	0507	SMEAR	4	132	1.5	10.1
05	F	0601	SMEAR	4	132	1.5	10.1
05	C	0602	SMEAR	2	112	0.0	-5.4
05	S	0603	SMEAR	14	134	9.0	11.6
05	W	0701	SMEAR	8	124	4.5	3.8
05	E	0703	SMEAR	3	117	0.7	-1.5
05	C	0706	SMEAR	4	123	1.5	3.1
05	C	0801	SMEAR	1	132	-.7	10.1
05	N	0803	SMEAR	3	131	0.7	9.3
05	F	0806	SMEAR	8	156	4.5	28.7
05	S	0903	SMEAR	9	148	5.2	22.5
05	F	0903	SMEAR	0	119	-1.5	0.0
05	C	1006	SMEAR	2	104	0.0	-11.6
05	F	1101	SMEAR	6	144	3.0	19.4
05	N	1102	SMEAR	2	155	0.0	28.0
05	C	1102	SMEAR	3	142	0.7	17.8
05	S	1201	SMEAR	7	120	3.7	0.7
05	F	1204	SMEAR	4	136	1.5	13.2
05	F	1207	SMEAR	5	123	2.2	3.1
05	C	1207	SMEAR	4	144	1.5	19.4
05	C	1305	SMEAR	2	126	0.0	5.4
05	C	1401	SMEAR	1	129	-.7	7.7
05	N	1402	SMEAR	0	127	-1.5	6.2

SMEAR DATA — 004 Hot Chem Lab

ROOM	SUR	GRID	TYPE	ALPHA COUNTS	BETA COUNTS	ALPHA DPM/100 CM SQ	BETA-GAMMA DPM/100 CM SQ
05	S	1402	SMEAR	6	127	3.0	6.2
05	F	1402	SMEAR	3	142	0.7	17.8
06	N	0101	SMEAR	1	134	-.7	4.6
06	E	0102	SMEAR	4	140	1.4	9.2
06	F	0106	SMEAR	5	124	2.2	-3.0
06	W	0202	SMEAR	2	109	0.0	-14.7
06	F	0202	SMEAR	8	146	4.4	13.9
06	C	0202	SMEAR	0	125	-1.4	-2.3
06	S	0203	SMEAR	2	137	0.0	6.9
06	C	0206	SMEAR	1	128	-.7	0.0
06	E	0503	SMEAR	3	150	0.7	17.0
06	W	0503	SMEAR	2	130	0.0	1.5
07	C	0302	SMEAR	4	132	1.5	-4.6
07	F	0401	SMEAR	5	123	2.2	-11.5
07	N	0602	SMEAR	2	208	0.0	59.7
07	S	0603	SMEAR	4	132	1.5	1.5
07	F	0702	SMEAR	3	128	0.7	-7.6
07	C	0801	SMEAR	5	114	2.2	-18.4
07	F	1101	SMEAR	6	120	3.0	-13.8
07	N	1203	SMEAR	3	240	0.7	84.2
07	C	1302	SMEAR	6	133	3.0	-3.0
07	S	1402	SMEAR	3	128	0.7	-1.5
07	F	1502	SMEAR	5	114	2.2	-18.4
07	C	1701	SMEAR	6	131	3.0	-5.3
07	S	1702	SMEAR	4	139	1.5	6.9
07	N	1002	SMEAR	1	129	-.7	-.7
07	F	2001	SMEAR	2	150	0.0	9.2
07	S	2103	SMEAR	8	117	4.5	-9.9
07	N	2303	SMEAR	6	130	3.0	0.0
07	C	2402	SMEAR	1	133	-.7	-3.8
07	F	2502	SMEAR	8	143	4.5	3.8
08	S	0102	SMEAR	3	136	0.7	8.0
08	F	0102	SMEAR	3	129	0.7	2.4
08	C	0103	SMEAR	1	127	-.7	0.8
08	F	0104	SMEAR	2	111	0.0	-12.0
08	C	0105	SMEAR	4	139	1.5	10.4
08	W	0202	SMEAR	5	147	2.3	16.8
08	N	0302	SMEAR	5	127	2.3	0.8
08	E	0302	SMEAR	4	126	1.5	0.0
08	F	0306	SMEAR	5	131	2.3	4.0
08	W	0602	SMEAR	3	106	0.7	-13.0
08	E	0702	SMEAR	10	159	6.2	26.4
09	E	0902	SMEAR	4	143	1.5	13.8
09	N	0902	SMEAR	2	140	0.0	11.2
09	W	0101	SMEAR	4	114	1.5	-7.2
09	N	0102	SMEAR	5	141	2.3	12.0
09	C	0103	SMEAR	2	124	0.0	0.0
09	F	0104	SMEAR	4	135	1.5	9.6

SMEAR DATA — 004 Hot Chem Lab

ROOM	SUR	GRID	TYPE	ALPHA COUNTS	BETA COUNTS	ALPHA DPM/100 CM SQ	BETA-GAMMA DPM/100 CM SQ
09	F	0201	SMEAR	3	153	0.7	24.0
09	E	0202	SMEAR	2	127	0.0	0.8
09	S	0202	SMEAR	3	137	0.7	11.2
09	W	0302	SMEAR	6	136	3.0	10.4
09	C	0302	SMEAR	3	124	0.7	0.8
09	F	0306	SMEAR	0	120	-1.5	-2.4
09	C	0306	SMEAR	1	135	-.7	9.6
09	E	0602	SMEAR	4	141	1.5	12.0
09	W	0602	SMEAR	0	130	-1.5	5.6
09	E	0602	SMEAR	5	144	2.2	4.6
09	E	1202	SMEAR	4	137	1.5	8.8

APPENDIX B

ANNEX C TO SPECIAL NUCLEAR MATERIAL
LICENSE NO. SNM-21

ANNEX C

GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT PRIOR TO RELEASE FOR UNRESTRICTED USE OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE, OR SPECIAL NUCLEAR MATERIAL

U. S. Nuclear Regulatory Commission
Division of Fuel Cycle and
Material Safety
Washington, D.C. 20555

NOVEMBER 1976

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The instructions in this guide in conjunction with Table I specify the radioactivity and radiation exposure rate limits which should be used in accomplishing the decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use. The limits in Table I do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control will be considered on a case-by-case basis.

1. The licensee shall make a reasonable effort to eliminate residual contamination.

2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table I prior to applying the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.

3. The radioactivity on the interior surfaces of pipes, drain lines, or ductwork shall be determined by making measurements at all traps, and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location as to make the surface inaccessible for purposes of measurement shall be presumed to be contaminated in excess of the limits.

4. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to, special circumstances such as razing of buildings, transfer of premises to another organization continuing work with radioactive materials, or conversion of facilities to a long-term storage or standby status. Such requests must:

   a. Provide detailed, specific information describing the premises, equipment or scrap, radioactive contaminants, and the nature, extent, and degree of residual surface contamination.

   b. Provide a detailed health and safety analysis which reflects that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

5. Prior to release of premises for unrestricted use, the licensee shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Table I. A copy of the survey report shall be filed with the Division of Fuel Cycle and Material Safety, USNRC, Washington, D.C. 20555, and also the Director of the Regional Office of the Office of Inspection and Enforcement, USNRC, having jurisdiction. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report shall:

   a. Identify the premises.

   b. Show that reasonable effort has been made to eliminate residual contamination.

   c. Describe the scope of the survey and general procedures followed.

   d. State the findings of the survey in units specified in the instruction.

Following review of the report, the NRC will consider visiting the facilities to confirm the survey.

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TABLE I

ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES [a]	AVERAGE [b c f]	MAXIMUM [b d f]	REMOVABLE [b e f]
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/100 cm^2	15,000 dpm α/100 cm^2	1,000 dpm α/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm^2	3,000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except SR-90 and others noted above.	5,000 dpm $\beta\gamma$/100 cm^2	15,000 dpm $\beta\gamma$/100 cm^2	1,000 dpm $\beta\gamma$/100 cm^2

[a] Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d] The maximum contamination level applies to an area of not more than 100 cm^2.

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TABLE I
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[e]The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped. .

[f]The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.